MILITARY SPECIFICATION

TANK, STORAGE, LIQUID OXYGEN/LIQUID NITROGEN, TMU-24/E

This amendment forms a part of Military Specification MIL-T-27720D dated 18 Aug 1967.

1. Page 1, Change Title to read:

TANK, STORAGE, LIQUID OXYGEN/LIQUID NITROGEN, TMU-24/E.

2. Page 1, Add Paragraph 1.2

1.2 CLASSIFICATION: Tanks covered by this Specification shall be of the following types:

TYPE I LIQUID OXYGEN 400 GALLON

TYPE II LIQUID NITROGEN 400 GALLON

3. Page 1, Change Paragraph 2. APPLICABLE DOCUMENTS and Paragraph 2.1 to read:

2. APPLICABLE DOCUMENTS

2.1 The following documents, of the issue in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein:

SPECIFICATIONS

Federal

UU-T-81	Tags, Shipping and Stock
PPP-T-60	Tape, Pressure-Sensitive Adhesive, Waterproof, for Packaging
FED-STD-595	

Military

MIL-C-104	Crates, Wood, Lumber and Plywood Sheathed, Nailed and Bolted
MIL-P-116	Preservation, Methods of
MIL-V-l73	Varnish, Moisture - and Fungus - Resistant (for the Treatment of' Communications, Electronic, and Associated Electrical Equipment)
MIL-P-514	Plates, Identific ation, Instruction and Marking, Blank .
MIL-R-3065	Rubber, Fabricated Parts
MIL-C-3767/12	Connector, Plug, Electrical (Power, Three-Wire, Polarized, Spring-Loaded Pivoted, Grounding Type) Type UP131M
MIL-I-6866	Inspection, Penetrant Method of
MIL-R-6868	Inspection Process, Magentic Particle
MIL-A-8421	Air Transportability Requirements, General Specification for

MIL-R-13689	Reflectorized Sheeting, Adhesive (Retro-Reflective)
MIL-H-27301	Hose Assembly, Metal, Cryogenic Liquid Transfer
MIL-P-27456	Purging Unit, Air, Liquid Oxygen Storage Tanks GSU-62/M
MIL-T-27730	Tape, Antiseize, Tetrafluorethylene, with Dispenser
MIL-STD-100	Engineering Drawing Practices
MIL-STD-129	Marking for Shipment and Storage
MIL-STD-130	Identification Marking of U.S. Military Property
MIL-STD-143	Specifications and Standards, Order of Precedence for the Selection of
MIL-STD-808	Finishes, Protective, and Codes for Finishing Schemes for Ground and Ground Support Equipment
MIL-STD-810	Environmental Test Methods for Aerospace and Ground Equipment
MIL-STD-831	Test Reports, Preparation of
MIL-STD-838	Lubrication of Military Equipment
MIL-STD-889	Metals, Dissimilar
MIL-STD-1186	Cushioning, Anchoring, Bracing, Blocking, and Waterproofing, with Appropriate Test Methods
MIL-STD-1359	"Cleaning Methods and Procedures for Breathing Oxygen Equipment
MS33656	Fitting End, Standard Dimensions for Flared Tube Connection and Gasket-Seal

Air Force-Navy Aeronautical

AN929	Cap Assembly, Pressure Seal, Flared Tube Fitting

DRAWINGS

Ordnance Corps

C8987830	Assembly, Lox Coupling, Male
C8987831	Assembly, Lox Coupling, Female
B8987832	Gasket, Lox or Lin
B8987833	Gasket, Lox or Lin-Dummy Drawing
B8987839	Ring, Retaining
A8987840	Ring, Reatining-Dummy Drawing
C8987855	Seat, Lox Coupling
C8987856	Cone, Lox Coupling
C8!387857	Nut, Lox Coupling
C8987869	Cap, Lox
C8987870	Plug, Lox
C8987876	Seat, LN2 Coupling
C8987877	Cone, LN2 Coupling
C8987878	Nut, LN2 Coupling
C8987888	Assembly, Liquid Nitrogen(LN2) Coupling, Male
C8987889	Assembly, Liquid Nitrogen(LN2) Coupling, Female
C8987890	cap, LN2
C8987891	Plug, LN2

Air Force

48B7796	Ring Assembly-Tiedown, 10,000 Pounds
59C6671	Hose, Transfer-Cryogenfc Liquid, Assembly of
66C1627	Fitting Assembly-Vacuum Disconnect

68A39469	Plug
68A39470	Body
68A39471	Vacuum Pump Out and Relief Assembly
68A39472	Cap
68A39473	Vacuum Pump Out Assembly
68B39474	Filter Assembly
7545352	Requirements for Finishes SA-ALC Ground Support Equipment

(Copies of specifications, standards, drawings, and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer).

4. Page 4, Figure 1, Change the wording “400 Gallon Lox Tank” to read:

TYPE I “400 Gal Lox Tank”

TYPE II “400 Gal LN2 Tank”

5. Page 5, Paragraph 3.4.2.2 DISSIMILAR METALS: Change the last sentence of this paragraph to read: “Dissimilar Metals are Defined in MIL-STD-889.”

6. Page 5, Delete Paragraph 3.4.3 and Substitute:

3.4.3 GASKETING AND INSULATING MATERIALS: Plastic, Rubber, or similar Gasketing and Insulating Materials shall be compounded to insure their suitability for the intended application and where applicable, their resistance to hydrocarbons or low temperatures, Mylar Super Insulation is acceptable for Annular Space Insulation.

7. Page 5, Add the following Paragraph under Section 3.4 MATERIALS:

3.4.6 RECYCLED, VIRGIN AND RECLAIMED MATERIALS:

Provided that all other requirements of this Specification are met, reclaimed materials shall be used to the maximum extent possible with no exclusion to the use of recovered materials and no requirement that an item be manufactured from virgin materials.

8. Page 5, Paragraph 3.5 DESIGN: Delete Paragraph 3.5.a and 3.5.b and substitute the following:

a. Being filled with liquid oxygen or nitrogen at supply location

b. Being air transported per requirements of MIL-A-8421 while filled with liquid oxygen or nitrogen and pressurized to 50 PSIG (See 6.3)

9. Page 8, Change Paragraph 3.6.9 to read:

3.6.9 THREAD SEALER: Tape conforming to MIL-T-27730 or other pipe thread sealing materials specifically approved by the procuring activity shall be applied to threads prior to assembly of all pipe threaded fittings subject to contact by Liquid/Gaseous oxygen or nitrogen. The tape shall be applied starting with the third thread to prevent contaminating the system.

10. Page 9, Change Paragraph 3.6.13 to read:

3.6.13 CERTIFICATION OF WELDERS: All welding shall be accomplished by welders certified in accordance with Section IX of the ASME Boiler and Pressure Vessel Code.

11. Page 12, Change Paragraph 3.8.1.3 to read:

3.8.1.3 INNER SHELL: The inner shell shall physically store the liquid oxygen or nitrogen. Insofar as practicable, it shall be designed to have the minimum surface area consistent with the requirements specified herein.

12. Page 14, Change Paragraph 3.8.1 .4.3 to read:

3.8.1.4.3 VACUUM FITTING: The outer shell shall be provided with a vacuum fitting designed for effective evacuation of the Annular Insulation Space.

13. Page 14, Change Paragraph 3.8.1 .4.3,1 to read:

3.8.1 .4.3.1 VACUUM SEAL-OFF VALVE: The vacuum seal-off shall conform to drawings 68A39469, 68A39470, 68A39471, 68A39472, and 68A39473. The seal-off valve shall serve as the vacuum pump-out, isolation valve, and outer shell safety-relief device.

14. Page 14, Delete Paragraph 3.8.1 .4,3.1.1 VACUUM LINE SHUTOFF VALVE MOUNTING.

15. Page 14, Delete Paragraph 3.8.1.4.3.3 VACUUM LINE DISCONNECT FITTING.

16. Page 14, Delete Paragraph 3.8.1,4.3.3,1 VACUUM LINE DISCONNECT FITTING. MOUNTING.

17. Page 15, Change Paragraph 3.8.1 .6,1 to read:

3.8.1 .6.1 If better material is utilized in the Annular Space, it shall be secured in direct thermal contact with the inner shell. In addition, the better material shall be of a type capable of being reactivated during evacuation at the temperature generated by the GSU-62/M purging unit.

18. Page 16, Add Subparagraph to 3.8.1 .7.1.1.1

LIQUID LINE INSTALLATION:

The line shall be connected to the outer shell by means of a flanged and bolted fitting.

19. Page 16, Delete Paragraph 3.8,1 ,7.1.1.2

LIQUID LINE INSULATION:

20. Page 16, Delete Paragraph 3.8.1 .7.1.2 LIQUID FILL LINE, And substitute:

3.8.1.7.1.2 LIQUID FILL LINE. The liquid fill line shall be sized and installed to provide for filling the tank with liquid oxygen through the liquid line specified in 3.8.1.7.1.1 at a rate of not less than 50 GPM without the pressure drop through the fill line (including the liquid fill line filter) and the liquid line exceeding 16 PSIG. Additionally, the liquid fill line shall be sized and installed to provide for filling the tank with liquid oxygen through the liquid line specified in 3.8,1 .7.1.? at a rate of not less than 25 GPM without the pressure drop through the fill line (including the liquid fill lien filter)' and the liquid line exceeding 6 PSIG. The liquid fill line shall terminate outside-the control housing assembly in an l-inch external

pipe thread for installation of the disconnect coupling, shall be of a minimum practible length to reduce evaporation losses, and shall have a diameter of not less than 1 inch.

21. Page 16, Change Paragraph 3,8,1 .7.1,2.2 to read:

3.8.1 .7.1.2.2 LIQUID FILL LINE DISCONNECT COUPLING.

For TYPE I, LIQUID OXYGEN, Use 1 inch, male, liquid oxygen coupling half assembly consisting of a coupling cap, seat, and gasket conforming to drawings C8987869, B8987855, and C8987833, respectively, assembled as shown on drawing C8987830, shall be installed on the liquid fill line pipe thread. The horizontal centerline distance between the fill 'tine termination and the servicing line termination shall be a minimum of 9 inches.

b. For TYPE II, LIQUID NITROGEN, Use 1-inch male, liquid nitrogen coupling half assembly consisting of a cap, seat, and gasket conforming to drawings C8987890, C8987876, and C8987833, respectively assembled as shown on drawing C8987888, shall be installed on the liquid fill line pipe thread, The horizontal centerline distance between the fill line termination and the servicing line termination shall be a minimum of 9 inches.

22. Page 17, Change Paragraph 3.8.1.7.1.3.4.3 LIQUID (FILL) LINE FILTER DESIGN to read: 3.8.1 .7.1.2.3.2 LIQUID FILL-DRAIN LINE FILTER DESIGN. The Filter shall be in line configuration conforming to drawing 68B39474 with the element constructed from stainless steel or monel. Sintered or powdered metal material shall not be utilized unless backed up by a wire-wound or wire-mesh cloth element in which the wires have been fused under controlled conditions so as to positively prevent migration of particles that-may be shed by the sintered or powdered metal portion. 'The filter element shall be fused to the houshg in a manner which will prevent bypass of the element. Elastomeric seals shall not be used in the filter design or construction. The proper direction of flow shall be plainly marked on each side of the filter housing in a prominent location.

23. Page 17, Delete Paragraph 3.8.1 ,7.1.2.4 LIQUID FILL LINE INSULATION,

24. Page 17, Delete Paragraph 3.8.1 .7.1.3 LIQUID SERVICING LINE. And substitute: 3.8.1 .7.1.3 LIQUID SERVICING LINE. The liquid servicing line shall be sized and installed to provide for transferring liquid oxygen from the inner shell through the liquid line specified in 3.8.1 .7.1,1 at a rate of not less than 25 GPM without the pressure drop through the liquid line and the liquid servicing line (including the liquid servicing line filter) exceeding 6 PSIG. The liquid servicing line shall be of minimum practicable length to minimize evaporation losses and shall have a diameter of not less than 1 inch.

25. Page 18, Delete Figure 2. FILTER GENERAL DESIGN AND CONSTRUCTION.

26. Page 19, Delete Paragraph 3.8.1.7.1.3.4 LIQUID SERVICING LINE INSULATION,

27. Page 19, Change Paragraph 3.8.1 .7.1.4 to read:

3.8.1.7.1.4 LIQUID SERVICING HOSE

For TYPE I, LIQUID OXYGEN one 10-foot length of cryogenic liquid hose, part number 59C6671-2-10 conforming to MIL-H-27301, shall be provided with the tank. One end of the hose shall be connected to the l-inch external pipe thread of the liquid servicing line disconnect fitting. The other end of the hose shall be provided with a l-inch close nipple and a l-inch female liquid oxygen coupling half assembly consisting of a coupling plug, nut, cone, and retaining ring conforming to drawing C8987870, C8987857, 68987856, and C8987840, respectively, assembled as shown on drawing C8987831.

b. For TYPE II, LIQUID NITROGEN one 10-foot length of cryogenic liquid hose, part number 59C6671-2-10 conforming to MIL-H-27301, shall be provialed with the tank. One end of the hose shall be connected to the l-inch external pipe thread of the liquid servicing line disconnect fitting. The other end of the hose shall be provided with a l-inch close nipple and a l-inch female liquid nitrogen coupling half assembly consisting of a plug, nut, cone, and retaining ring conforming to drawings C8987891, C8987878, CS987877, C8987840 and assembled as shown on drawing C8987889.

28. Page 20, Change Paragraph 3.8.1 .7.1.5.1 VAPOR VENT" LINE" INSTALLATION to read: 3.8.1 .7.1.5.1 VAPOR VENT LINE INSTALLATION. The vapor vent line shall be installed to minimize heat transfer between the inner and outer shells. The line shall extend along the top inside of the inner shell and shall be so equipped with spray holes or similar provisions that cleaning fluid pumped into the inner shell through the vapor vent line will be sprayed against the inside top of the inner shell to flush sediment and other contaminant materials from the tank. Connection to the tank shall be flanged and bolted fitting.

29. Page 22, Delete Paragraph 3.8.1 .9.2 OUTER SHELL SAFETY HEAD and substitute:

3.8.1.9.2 OUTER SHELL SAFETY HEAD. The outer shell safety head shall be as specified in 3.8.1 .4.3.1

30. Page 25, Change Paragraph 3.8.1 .10.1.1.2 VALVE CYCLING-AND LEAKAGE PERFORMANCE to read:

3.8.1.10.1.1.2 VALVE CYCLING AND LEAKAGE PERFORMANCE. When closed with torque of 60 Plus or Minus 5 inch pounds per inch o-F nominal size, and with the valve body at either ambient temperature or the atmospheric pressure boiling temperature of liquid oxygen or nitrogen, the valves shall not leak more than 2 cubic inches of free air, oxygen, or nitrogen gas per hour per inch of nominal size from 50 PSIG to a downstream pressure of O PSIG. The valves shall be capable of not less than 2,000 cycles of operation (See 6.4.6) when subjected to a differential pressure of 50 PSIG while closed, including at least 1,000 cycles at ambient temperature and 1,000 cycles with the valve body at the atmospheric pressure boiling temperature of liquid oxygen or nitrogen without adjustment, repair, or maintenance, and without the above specified leakage rate being exceeded when tested per paragraph 4.6.15.3.

31. Page 27, Delete Paragraph 3.8.1.11.3 VACUUM INDICATOR. And substitute:

3.8.1 .11.3 VACUUM SENSING TAP. A vacuum sensing tap into the annular space shall be provided for attachment of the thermocouple 6685-887-9593, The tap

location and installation will allow attachment and detachment of vacuum sensing equipment without destroying or appreciably degrading the vacuum in the annular space,

32. Page 27, Delete Paragraph 3.8.1 .11.3,1 TYPE.

33. Page 27, Delete Paragraph 3,8,1.11.3,2" VACUUM" CONNECTION,

34. Page 27, Delete Paragraph 3.8.1.11.3.3 MOUNTING,

35. Page 30, Delete Paragraph 3.12.2.1

36. Page 30, Change Paragraph 3.12.2 EXPOSED PARTS AND SURFACES to read:

3.12.2 EXPOSED PARTS AND SURFACES. All exposed metal parts and surfaces, except parts and surfaces that contact high purity oxygen/nitrogen, shall be cleaned, treated, and finished per Air Force San Antonio ALC Drawing 7545352. The final finish paint coating shall be colored as follows:

For TYPE I, LIQUID OXYGEN: Control housing, frame and tank shall be painted dark green, Federal Standard 595, Number 24052.

b. For TYPE II, LIQUID NITROGEN: Control housing, frame and tank shall be painted gray, Federal Standard 595, Number 36118.

37. Page 30, Change Paragraph 3.13.1 TANK-MARKINGS to read:

3.13.1 TANK MARKINGS

a. For TYPE I, LIQUID OXYGEN: Tank description and warning markings shall be in the form of decalcomanias which shall be Government furnished property. Each tank shall require 3 each of the decalcomanias described by San Antonio Air Logistics Center/SFRM Part Number 8221044 for liquid oxygen. A decalomania shall be centered and applied on each side of the tank and on the end of the tank, opposite the control cabinet.

b.. For TYPE II, LIQUID NITROGEN: Tank description and warning markings shall be in the form of decalcomanias which shall be Government furnished property. Each tank shall require 3 each of the decalcomanias described by San Antonio Air Logistics Center/SFRM Part Number 221045-1 for liquid nitrogen. A decalcomania shall be centered and applied on each side of the tank, opposite the control cabinet.

38. Page 30, Delete Paragraph 3.13.7.? THE LETTERING LIQUID OXYGEN.

39. Page 30, Delete Paragraph 3.13.1.2 THE LETTERING NO SMOKING WITHIN 50 FEET.

40. Page 33, Change Paragraph 3.16.1 DECREASING to read:

3.16.1 DECREASING. Tank surfaces, parts, fittings, etcetera that will be in contact with high purity oxygen shall be degreased in accordance with procedures in MIL-STD-1359. Precautions shall be taken to insure that solvents do not contact parts fabricated from incompatible materials.

41. Page 51, Change Paragraph 4.6.18.2 HIGH TEMPERATURE to read:

4.6.18.2 HIGH TEMPERATURE. The liquid storage tank assembly shall be filled to design capacity with liquid oxygen or liquid nitrogen and Subjected to high temperature in accordance with method 501 procedure I. In step 2 arid step 3 or procedure I, the internal chamber temperature shall be 125 degrees F. In step 4 and 5 of procedure I, the internal chamber temperature shall be 160 degrees F.

CUSTODIANS:

AIR FORCE - 68

REVIEWER ACTIVITY:

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